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ABSTRACT

This manual designed for grade 3 is part of a series for a program to integrate the teaching and learning of mathematical and computer concepts and skills in the elementary school. The manual contains 20 lessons. Each lesson includes information on the topic, suggested grade level, mathematics concepts and skills, objective, prerequisite skills needed, and activities. Topics contained in the lessons include: (1) problem solving; (2) geometry; (3) numbers; (4) measurement; (5) number concepts; (6) addition; (7) time; (8) LOGO; (9) division; (10) fractions; and (11) probability, statistics, and graphing. Software programs used for the activities are specified for each lesson. (KR)

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Mathematics / Computer Integrated Curriculum
Grade 3

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How can Integrated Computer Curriculum be used in Elementary School (and can I do it?)

by: Michelle Murray-Hurst

Upon entering the last decade of the 20th century-- we are continuing to move forward into the age of technology. Computers of some types have been around since the 1940's and have been used in the school setting since the 1960's. But, are we using the computers effectively and if so, are we integrating them into the regular curriculum? Educators seem to be aware of the need for computer instruction in the middle and upper grades but often it is thought that computers in the lower elementary grades are only for drill, practice, and games. WRONG!! These young children are very interested in computers and are capable of solving some complex problems. Many times students find that grasping concepts is easier using the computer rather than the traditional methods of instruction. Because children are unique and have different learning styles it seems important to provide as many learning opportunities as possible. The computer allows increased methods by providing visual, tactile, and some times auditory responses.

But, let's face the problem, computers are an important part of instruction at all grade levels but the most important fact is to use them on a primary level. Elementary education is the perfect place to begin a strong base of computers because of these students' hunger for knowledge. Mathematics conveniently lends itself to the integration of the computer. It can be done and is being done today. Integration may take a little extra time and effort but the rewards could be bountiful. The mathematics

curriculum is relatively simple and all of the objectives may be taught or enriched by using the computer.

Now is the time that educators realize that computers are our friends and want to make our lives easier. It is our responsibility to allow our children to grow up with computer knowledge and not be afraid to experience new technological advances.

Integration of computers into the curriculum is here today and is something that can be easily expanded through ingenuity and creativity. Many curriculum documents to assist teachers in making this transition have been developed. This document was designed for kindergarten through sixth grade and the lessons can be presented by teachers with very little computer experience. So we recognize that integration can be easily done.

Computer Lesson #3.1

Topic: Introduction to Terrapin Logo

Suggested Grade Level: 3

Content Description: Introduces basic Terrapin Logo Commands.

Prerequisite Student Skills: Basic understanding of Easy Logo.

Activities: Enter ST(to show turtle). You will also be using these commands: FD, BK(these move the turtle forward and backwards. They alsc draw lines. They also draw lines. To use these, you must enter a distance which lets the turtle know how far to move(50=approximately 1/2 inch); RT and LT turns the cursor right or left. You must enter a degree. PU lifts the turtle. PB lowers the turtle.

1. FD 50
2. RT 90
3. FD 50
4. RT 90
5. FD 50
6. RT 90
7. FD 50

You should now have a square on the screen!

8. PU (Move the turtle to a blank space on the screen by using FD, BK, RT, and LT.)
9. PD
10. BK 50
11. LT 90

12. BK 70
13. LT 90
14. BK 50
15. LT 90
16. BK 70
17. HOME
18. Hit "return"
19. CS
20. Hit "return" (You now have a blank screen.)

Now draw a picture of your choice using these commands: FD, BK, RT, LT, PU, and PD.

Instructional Resource: LOGO (Terrapin)
Learning with LOGO
Apple II

Computer Lesson #3.2

Topic: Logo Repeat

Suggested Grade Level: 3

Content Description: Students will learn how to use the "repeat" command.

Prerequisite Student Skills: Basic understanding of Terrapin LOGO.

Activities:

1. To Square
2. Repeat 4[FD 50 RT 90]
3. Press control and c
4. Repeat 25[Square RT 30]
5. To Circle
6. Repeat 360[FD 1 RT 1]
7. Press control and c
8. Repeat 6[Circle RT 45]
9. HOME
10. CS
11. Repeat 6[Square RT 45 Circle RT 45]

Instructional Resource: LOGO
Learning With LOGO
Apple II

Computer Lesson #_3.3____

Topic: Problem Solving

Suggested Grade Level: 3

Mathematical Essential Element: 1

Descriptor: 1.7

Objective: Guessing and checking.

Content Description: Students will be asked to do simple addition.

Prerequisite Student Skills: Addition facts.

Activities:

```
10 REM ***ADDITION FACTS***
15 LET C=0
20  DATA  2,5,9,7,3,4,9,6,8,10,10,7,8,1,8,2,5,7,12,3
30  DATA  7,3,6,1,9,4,0,3,6,1,8,6,3,5,10,7,9,11,5,6
35 FOR C=1 TO 20
37 LET C=C + 1
40 READ N
50 READ S
60 PRINT N "+" S
70 INPUT X
75 PRINT "THE CORRECT ANSWER IS..."
80 PRINT N + S
90 PRINT "DO YOU WISH TO CONTINUE ?"
100 INPUT Y$
110 IF Y$= "NO" THEN GOTO 200
120 NEXT C
200 PRINT "GOODBYE !!!"
210 END
```

Computer Lesson # 3.4

Topic: Commutative Property of Addition

Suggested Grade Level: 3

Mathematical Essential Element: 4

Descriptor: 4.1

Objective: To demonstrate that the sum of addends stays the same, regardless of the order of addends.

Content Description: The teacher will help students understand the term "commute." Then, the students will be able to see how the order of addends does not affect the sum of a mathematical sentence.

Prerequisite Student Skills: Students should know what addend sum, and number lines are. They also need to know EZ LOGO commands.

Activities: EZ LOGO (MECC)

1. Place number line transparency over the screen.
2. PU
3. Move turtle to "0" on number line.
4. PD
5. R
6. R
7. R (The turtle should be heading toward "1".)
8. F
9. Where are you? Circle this number with your Vis A Vis.
10. F
11. F
12. F

13. Where are you? Circle this number.
14. Therefore, 1+3=4
15. PU
16. Go back to "0"(B,B,B,B).
17. PD
18. F
19. F
20. F
21. F
22. Where are you? Circle this number.
23. F
24. Where are you? Circle this number.
25. Therefore, 3+1=4

Point out that the order of addends changed, but the sum stayed the same. The addends moved or commuted.

Clear the screen(CS). Do this activity several times with various addends. Then , use more than two addends.

USING MORE THAN TWO ADDENDS

1. CS
2. Do Steps 1-7 in previous activities.
3. F
4. F
5. Where are you? Circle the number.
6. F
7. F
8. F
9. F
10. Where are you? Circle the number.
11. F
12. Where are you? Circle the number.
13. Therefore, 2+4+1=7

14. PU

15. Return to "0". (B,B,B,B,B,B,B)

16. PD

17. Now, repeat this same problem using the addends in the following order--4,1,and 2.

18. What happens? (The sum stays the same.)

19. IT'S MAGIC!

This can also be used to show associative or grouping property.

i.e. (2+3)+6=11 and 2+(3+6)=11

Instructional Resource: EZ LOGO (MECC)

Apple II

Computer Lesson #3.5

Topic: Problem Solving

Suggested Grade Level: 3

Mathematical Essential Element: 1

Descriptor: 1.7

Objective: Guessing and checking.

Content Description: Students will create their own math problems.

Prerequisite Student Skills: How to add, subtract,multiply, and/ or divide.

Activities: Students will randomly enter math problems into the computer by entering ? skipping a space and entering the problem. Students should try to solve the problem before hitting return. Use these symbols:

*	Multiply
/	Divide
+	Add
-	Subtract

Instructional Resource: Basic

Apple II

Computer Lesson #3.6

Topic: Multiplication

Suggested Grade Level: 3

Mathematical Essential Element: 4

Descriptor: 4.4

Objective: To show students that multiplication is repeated addition by using patterns from explorations and properties of whole numbers to generate multiplication facts with meaning.

Content Description: The students will be asked to make a series of moves.

Prerequisite Student Skills: Students should know the concept of addition and commands of EZ-LOGO.

Activities:

1. Start at 0
2. F
3. F
4. F (This moves you three spaces.)
5. Where are you? (3)
6. F
7. F
8. F
9. Where are you? How many times did you move?
   Point out that 3 + 3 = 6 or 3 * 2 = 6
10. Repeat the above procedure a couple of times, using different steps forward. Next, make the series longer.
    For instances, 1. Start at 0.
    2. F

3. F

4. F

5. F

6. F

Where are you?

7. F

8. F

9. F

10. F

11. F

Where are you?

12. F

13. F

14. F

15. F

16. F

Where are you?

17. F

18. F

19. F

20. F

21. F

Where are you? Can you see that five times two is 10; five times three is fifteen. Therefore, 5+5+5+5=20 or 5*4=20.

Instructional Resource: LOGO
Mathematics Today
Apple II

Computer Lesson #3.7

Topic: Division of whole numbers without remainders.

Suggested Grade Level: 3

Mathematical Essential Element: 4

Descriptor: 4.2

Objective: To divide a line segment into equivalent parts to show the meaning of division; to define quotient, dividend, and divisor.

Content Description: The student will make a given line segment and and divide it a given number of times to get a division sentence and name the quotient.

Prerequisite Student Skills: EZ-LOGO commands

Activities:EZ-LOGO

The student will need to carry a sheet of paper and a pencil to the computer.

1. First, the student will make a line segment.

   R
   R
   R
   F
   F
   F
   F
   F
   F
   F

2. NEXT, the student will break the segment into equal parts by moving a given number of times.

R

R

R

R

R

R

F

F

3. Make one mark on paper.

   F

   F

4. Make another mark next to the first one.

   F

   F

5. Make another mark next to the previous ones. Now, count your marks. How many do you have? (3)

Therefore, 6 grouped by 2's equals 3 groups. (6 / 2 = 3). At this point define quotient, divisor, and dividend. Do Various lengths. Make sure the remainder is "0". After grasping the concept of division, the students will be able to see how remainders fot into the process.

Instructional Resource: LOGO

Mathematics Today

Apple I

Computer Lesson #3.8

Topic: Problem Solving

Suggested Grade Level: 3

Mathematical Essential Element: 1

Descriptor: 1.2

Objective: Analyzing problems by identifying relationships discriminating relevant patterns, sequencing, prioritizing, and questioning.

Content Description: To solve the puzzles, students learn to catagorize and analyze color, shape, and patterns and their relationships.

Activities:

1. Insert Gertrude's Puzzles Diskette
2. Read and follow directions on the screen.
3. When it is time for the student to choose an activity, they will select "Box Puzzles." Follow directions on the screen.

Instructional Resource: Gertrude's Puzzle, The Learning Company
Apple II

Computer Lesson #3.9

Topic: Measurement

Suggested Grade Level: 3

Mathematical Essential Element: 5

Descriptor: 5.6

Objective: Telling time on digital and traditional clocks (to the nearest minute.)

Content Description: The students will construct a circle to use as a clock. Next they divide the clock into intervals of minutes.

Prerequisite Student Skills: Terrapin LOGO commands.

Activities:

1. HOME
2. CS
3. TO CIRCLE
4. REPEAT 360[FD 35 RT 1]
5. END
6. PRESS CONTROL AND C at the same time.
7. TO MINUTE
8. REPEAT 60[FD 35 BK 35 RT 6]
9. END
10. PRESS CONTROL AND C at the same time.
11. ST
12. CIRCLE (We will use this as a clock.)
13. MINUTE (The clock will be divided into 60 parts. Point out that each section represents a minute.)
14. Tape a clean transparency over the screen. Allow students to draw the clock hands for various times.

Computer Lesson # 3.10

Topic: Measurement

Suggested Grade Level: 3

Mathematical Essential Element: 5

Descriptor: 5.2

Objective: To define the term "perimeter" and to find the perimeter of various sized rectangles.

Content Description: The students will be given rectangles of various size. Then, they will be asked to find the perimeter.

Prerequisite Student Skills: EZ-LOGO commands how to add whole numbers, how to construct geometric shapes in EZ- LOGO.

Activities: EZ-LOGO (MECC)

1. Place Transparency #04 over screen.
2. PU
3. Place Turtle at dot on Fig. A.
4. Move the Turtle forward until you get to the next corner. (X)
5. How many moves did it take? Write the Number of moves on the line segment. (5)
6. R
7. R
8. R
9. Move the Turtle forward until you get to the next corner (Diamond symbol is here.)
10. How many moves? Write the answer on the transp. (3)

11. R
12. R
13. R
14. Move the turtle forward and to the next corner (v).
15. How many moves? Write it on the transp. (5)
16. R
17. R
18. R
19. Move forward to the next corner (.)
20. How many moves? Write it down. (3)
21. You should be back at the starting point.
22. Add all the numbers that you have written of the rectangle. 5+3+5+3=16

Repeat the procedure with figures B and C.

This lesson is also a good review on properties of a rectangle. It's also an excellent way to reinforce the concept of the commutative and associative properties of addition.

NOW!!

Allow the students to construct their own geometric shapes (sq., rec., tri., trapezoids) and let another student find the perimeters.

Instructional Resource: LOGO
Apple II

Computer Lesson #3.11

Topic: Fractions

Suggested Grade Level: 3

Mathematical Essential Element: 3

Descriptor: 3.7

Objective: Using concrete models and patterns to represent different names for the same fractional part. The student will show different names for the fraction 1/2.

Content Description: After giving different names for 1/2 the student will use a grid to plot the ordered pairs. If the fractions are equivalent, there will be a straight line.

Prerequisite Student Skills: Be able to plot on a grid; using X axis and Y axis. Be able to write fractions.

Activities: "Ways to Say 1/2" pg. 26 "Bumble Games

1. Fill in the missing numbers. (pg. 26)
2. Go to computer. Use Bumble Games Diskette game #6 (Bumble Dots)
3. Choose #2 "Make Your Own"
4. Plot points from the worksheet.
5. Name the shape.
6. Change the 1/2 to 1/3. Fill in the missing numbers.
7. Go to the computer. Use Bumble Games diskette game #6 (Bumble Dots).
8. Choose #2 "Make Your Own".
9. Plot points from the worksheet.
10. Name the shape.
11. Stress that equivalent fraction, when plotted on a

grid, form a straight line. Which fractions are naming the same fraction?

Instructional Resource: Bumble Games (Pg. 26) The Learning Co.
Apple II

Computer Lesson #3.12

Topic: Number and Numberation Concepts.

Suggested Grade Level: 3

Mathematical Essential Element: 3

Descriptor: 3.6

Objective: Using models to compare fractional parts.

Content Description: The students will draw a rectangle. Then they will divide it into halves. Next they will divide it into fourths.

Prerequisite Student Skills: The students should know Terrapin LOGO commands.

Activities:

1. HOME
2. CS
3. TO RECTANGLE
4. REPEAT 2[FD 100 RT 90 FD 60 RT 90]
5. END
6. PRESS CONTROL AND C at the same time.
7. TO THREEFOURTH
8. REPEAT 2[FD 50 RT 90 FD 60 RT 90]
9. END
10. PRESS CONTROL AND C at the same time.
11. TO HALF
12. REPEAT 2[FD 50 RT 90 FD 60 RT 90]
13. END
14. PRESS CONTROL AND C at the same time.
15. TO FOURTH

16. REPEAT 2[FD 25 RT 90 FD 60 RT 90]
17. PRESS CONTROL AND C at the same time.
18. ST
19. RECTANGLE

    What happened? (A rectangle should appear on screen.)
20. THREEFOURTH
21. HALF
22. FOURTH

QUESTIONS:

1. If one section of the rectangle was shaded (1/4), what part is not shaded? (3/4).

2. How would you shade 2/4? (Two sections would be shaded.)

3. What happens if you shade 4 sections? (4/4 or 1 whole is shaded.)

Instructional Resource: LOGO

Apple II

Computer Lesson #3.13

Topic: Probability, Statistics and Graphing

Suggested Grade Level: 3

Mathematical Essential Element: 1

Descriptor: 1.7

Objective: Selecting appropriate strategies from a variety of approaches.

Content Description: The students will use ordered pairs to play Tic Tac Toe on a grid.

Prerequisite Student Skills: Be able to name ordered pairs.

Activities:Bumble Games

Game #5 "Tic Tac Toc"

This is a two player game. To win, you must be the first player to get a point, name its ordered pair (X,Y).

Instructional Resource: "Bumble Games" , The Learning Company

Apple II

Computer Lesson #3.14

Topic: Probability, Statistics and Graphing

Suggested Grade Level: 3

Mathematical Essential Element: 7

Descriptor: 7.8

Objective: Building patterns displaying pairs of objects from two different sets.

Content Description: Buildung patterns from two different sets.

Prerequisite Student Skills: How to lable/list ordered pairs.

Activities: Load Tic Tac Toc (Bumble Games Number 5.) in pairs students will play tic tac toe by naming the ordered pair for the location of their X or O. Four in a row wins.

Instructional Resource: "Bumble Games", The Learning Co.
Apple II

Computer Lesson #3.15

Topic: Probability, Statistics, and Graphing

Suggested Grade Level: 3

Mathematical Essential Element: 7

Descriptor: 7.7

Objective: Locating points on a grid.

Content Description: Students will name ordered pairs to construct a picture.

Prerequisite Student Skills: How to label ordered pairs.

Activities: Load "Bumble Dots" (Bumble Games Number 5.) This game is played by entering ordered pairs randomly which, are connected to draw a picture or by entering the ordered pair which the computer provides.

Instructional Resource: "Bumble Games", The Learning Co.
Apple II

Computer Lesson #3.16

Topic: Geometry

Suggested Grade Level: 3

Mathematical Essential Element: 6

Descriptor: 6.2

Objective: Investigating congruence and symmetry using computer graphics.

Content Description: The student will construct a shape and flip it to show symmetry is a mirror image.

Prerequisite Student Skills: Terrapin LOGO commands.

Activities:

1. Home
2. CS
3. TO ARC
4. REPEAT 60[FD 1 RT 1]
5. END
6. PRESS CONTROL AND C at the same time.
7. TO PETAL
8. ARC
9. RT 120
10. ARC
11. END
12. PRESS CONTROL AND C at the same time.
13. TO BLOSSOM
14. REPEAT 6[PETAL RT 60]
15. END
16. PRESS CONTROL AND C at the same time.
17. TO CUT

18. FD 50 BK 100
19. END
20. PRESS CONTROL AND C at the same time.
21. TO BLOSSOM2
22. REPEAT 5[PETAL RT 60]
23. END
24. PRESS CONTROL AND C at the same time.
25. ST
26. PU
27. RT 90
28. FD 75
29. PD
30. BLOSSOM
31. CUT

    IS THIS LINE SYMMETRICAL? (YES) WHY OR WHY NOT?
32. PU
33. LT180
34. FD 75
35. PD
36. BLOSSOM2
37. CUT

    IS THIS SYMMETRICAL? (NO) WHY OR WHY NOT?

Instructional Resource: LOGO

LEARNING MATH WITH LOGO

Apple II

Computer Lesson #3.17

Topic: Geometry

Suggested Grade Level: 3

Mathematical Essential Element: 6

Descriptor: 6.1

Objective: Recognize and draw a square.

Content Description: The students will construct various size squares. Then, the students will use these shapes to make a picture.

Prerequisite Student Skills: LOGO commands, definition of right angle.

Activities:Terrapin LOGO

Square

1. FD 50
2. RT 90
3. FD 50
4. RT 90
5. FD 50
6. RT 90
7. FD 50
8. RT 90

Point out that all sides are equal and all angles are right angles.

Allow the students various sizes of squares. Now, put squares together to form a picture or pattern.

Computer Lesson #3.18

Topic: Geometry

Suggested Grade Level: 3

Mathematical Essential Element: 6

Descriptor: 6.6

Objective: Identifying Applications of Geometry

Content Description: Students will use basic geometric shapes to form pictures. These pictures will be used to point out various geometric shapes.

Prerequisite Student Skills: Basic familarity with EZ-LOGO and geometric shapes.

Activities:Using these commands students at=re to create a picture and tell what geometric shape equals what. For example, a triangle could be an icecream cone and a circle could be the icecream.

PU = Pin up (Turtle does not write)

PD = Pin down (Turtle is now ready to write)

B = Backward (Moves the Turtle backwards)

F = Forward (Moves the Turtle Forward)

R = Right (Turns Turtle 30 degrees to the right)

L = Left (Turns Turtle 30 Degrees to the left)

ST = Show Turtle (Do this immediately after loading)

HT = Hides Turtle

Instructional Resource: EZ-LOGO

Apple II

Computer Lesson #3.19

Topic: Geometry

Suggested Grade Level: 3

Mathematical Essential Element: 6

Descriptor: 6.5

Objective: Investigating various types and degrees of angles.

Content Description: This lesson will allow students to see the various types and degrees of angles.

Prerequisite Student Skills: Slight understanding of angles and triangles.

Activities: A.) 1. Press N

2. Press 3 (you are now able to work with angles of varing degrees from 0-180 degrees.)
3. Enter a degree (45 will show a 45 degree angle.)
4. Press N
5. Press 3
6. Enter a degree (These steps can be repeated showing a variety of degrees and angles.)

B.) 1. Press N

2. Press 4
3. Press 1 (Right angle will be displayed.)
4. Press M
5. Press 4
6. Enter CAB

7. Press Return

   Return (This will show the degree of angle CAB.)

   Return

8. Enter ABC
9. Press Return

   Return

   Return

10. Enter BCA
11. Press Return

    Return

    Return

This activity (B) can be repeated showing the various types of angles by pressing 2,3,4, or 5 for an acute, obtuse, isosclese, or equalateral respectively.

Instructional Resource: Geometric Pre-Supposer

Apple II

Computer Lesson #3.20

Topic: Geometry

Suggested Grade Level: 3

Mathematical Essential Element: 6

Descriptor: 6.2

Objective: Investigating congruence and symmetry using computer graphics.

Content Description: The student will construct various shapes and decide if they are symmetrical.

Prerequisite Student Skills: Terrapin LOGO commands.

Activities: 1. HOME

2. CS

3. TO STAIR

   PU

   BK 50

   LT 90

   FD 125

   RT 90

   PD

   REPEAT 4[FD 25 RT 90 FD 25 LT 90]

   END

   PRESS CONTROL AND C at the same time.

4. TO STAIR2

   RT 180

   REPEAT 3[FD 25 LT 90 FD 25 RT 90]

   FD 25

   END

   RESS CONTROL AND C at the same time.

5. TO SYMM

PU

LT 90

FD 122.5

LT 90

PD

FD 200

END

PRESS CONTROL AND C at the same time.

6. TO SYMM2

PU

RT 90

FD 87.5

RT 90

PD

FD 200

END

PRESS CONTROL AND C at the same time.

6. HOME

CS

ST

STAIR

STAIR2

SYMM

Is this symmetrical? (No) Why or why not?

HOME

CS

STAIR

STAIR2

SYMM2

Is this symmetrical? (Yes) Why or why not?